days, for U. S. Weather Bureau at New York 15.48 days, and for Meteorological Observatory at New York 14.03 days. It will be seen by these figures that there is a greater number of days of rainfall at the two stations in the British Isles than there has been at New York, and a much wider range of the number of days, whereas the records in the city of New York show that there is a less number of days, and the number of days is very limited in its range. These figures should efface from the card of probabilities this superstition of St. Swithin's Day so far as the climate of the United States is concerned. Altho the records of the climate of Great Britain show a larger number of days of rainfall there than in the city of New York, yet the old legend should receive the same favor there as in this country. It seems to be almost useless to say anything further regarding the absurdity of this old superstition, with such an array of telltale figures all set against the legend.

It has been suggested that the greater precipitation at our southern coast cities would show a much higher average than at New York, if it did not show that the old legend would at times hold good; but an examination of the records of two of the southern weather stations shows that the higher average during the period is of no moment, and that there has never been a year when there were 40 successive days of rain after July 15.

THE "SANTA ANA" OF CALIFORNIA.

The dust storms of the San Gabriel Valley are described by Prof. George E. Hale in the following quotation from his report in the Annual Volume for 1906, of the Carnegie Institution of Washington:

I have previously alluded to the dust storms which sometimes enter the San Gabriel Valley thru the Cajon Pass from the Mojave Desert, and those much rarer storms in which the dust is carried by the wind completely over the Sierra Madre Mountains. In the more common form of dust storm (the so-called "Santa Ana") the dust enters the valley in a fairly well-defined mass and proceeds westward along the canyon of the Santa Ana River. In approaching the coast it spreads over a large area and diffuses itself with tolerable uniformity thru the lower atmosphere. I have seen from Mount Wilson a dust storm in the region of Riverside which in twenty-four hours had spread itself over Los Angeles and Pasadena. When it reached this part of the valley there was almost no wind, and the dust seemed to diffuse itself thru the air. Such storms sometimes completely hide the Sierra Madre Mountains from observers in Pasadena. Fortunately they are almost always confined to the lower atmosphere, and do not appreciably affect the transparency of the sky above Mount Wilson, where daily observations show that the transparency of the day and night sky are very satisfactory.

STANDARD TIME.

According to the Monthly Notices, Royal Astronomical Society, February, 1907, the standard time used in India since July 1, 1905, has been five hours and thirty minutes fast on Greenwich time; that of Burma is six and a half hours fast, but the time ball of the Colaba Observatory, Bombay, which is about 73° east of Greenwich, drops daily at exactly 3 a. m., Greenwich time, or about 8 a. m., local time. The Council at Port Louis, Mauritius, has decreed that from and after January 1, 1907, the standard time for that colony and its dependencies shall be that of the meridian 60° east of Greenwich. (The longitude of Mauritius is about 58°.) The standard for the Seychelles is also four hours fast on Greenwich time; but the standard for the Chagos Archipelago is five hours east of Greenwich. These regular hour standards are convenient for local use in many respects; but when it comes to interchange of meteorological data by cable and wireless, as well as by the ordinary telegraph and telephone, it would seem that the time must soon come when the world will find it best to adopt the Greenwich time uniformly. We do not, ourselves, appreciate the necessity for having, in India and the ocean south of it, four different standards (four, five, five and a half, and six and a half hours from Greenwich). The inconvenience of an irregular and arbitrary system of standards is appreciable, tho of course not to be compared with the confusion that existed before any standard was adopted. We fear that the subdivision into half and quarter hours will do more harm than good.—EDITOR.

PENALTY FOR COUNTERFEITING FORECASTS.

The Agricultural appropriation bill for the fiscal year ending June 30, 1906 [Statutes at Large, vol 33, part 1], contained the following legislative item:

Any person who shall knowingly issue or publish any counterfeit weather forecasts or warnings of weather conditions, falsely representing such forecasts or warnings to have been issued or published by the Weather Bureau, or other branch of the Government service, or shall molest or interfere with any weather or storm flag or weather map or bulletin displayed or issued by the United States Weather Bureau, shall be deemed guilty of a misdemeanor, and, on conviction thereof, for each offense, be fined in a sum not exceeding five hundred dollars, or be imprisoned not to exceed ninety days, or be both fined and imprisoned, in the discretion of the court.—(See Act of Congress approved March 3, 1905.)

EQUINOCTIAL STORMS.

By Prof. E. B. GARRIOTT.

The term "equinoctial storms" has for centuries been applied to storms that happen near the spring and autumn equinoctial periods. Like many other popular impressions regarding imperfectly understood natural phenomena the general idea had its origin in observed facts. The difficulty in this case has been that the facts concerning the character and seasonal and geographical limits of storms that are associated with the equinoxes have given way to fancy. The rainy season of the Tropics, and the storms of the middle latitudes that occur in the spring and fall, have been confused with the severer storms known as hurricanes, cyclones, and typhoons that are experienced in the tropical and subtropical regions and even in the middle latitudes in certain seasons of the year.

The rainy season of the Tropics, which is entirely distinct from the season of equinoctial storms, attends the annual march of the sun over the equatorial regions. When the sun in its northward journey crosses the imaginary line of the equator the rainy season sets in over the northern equatorial region, and the rain belt keeps pace with the northward movement of the sun until the time of the summer solstice, about June 21, when the sun reaches the point farthest north in its course. About that time the rain belt reaches into the northern subtropical regions, like Florida, and the rainy season begins in those regions. In tropical countries, like the Isthmus of Panama, there is usually a short, dry season in the interval following the northward movement of the rain belt and its return southward with the sun. The characteristics of the rains of the Tropics are controlled largely by geographical and topographical features. They come in the form of local thunderstorms that are often attended by torrential rains and sometimes by severe wind squalls. Their occurrence is usually confined to the afternoon and the early portion of the night.

The season of severe tropical, or equinoctial, storms in the Northern Hemisphere, and more especially in the tropical and subtropical North Atlantic Ocean, does not begin until the sun has about half completed its return course to the equator. They occur near the time of the autumnal equinox, and their season extends from August to October, inclusive. In the North Atlantic Ocean these storms are called hurricanes, in the Indian Ocean, cyclones, and in southeastern Asiatic waters, typhoons. In the Pacific area the typhoon season begins earlier and continues later than the hurricane season of the North Atlantic Ocean.

At first sight it appears that astronomical events that forerun by several weeks meteorological phenomena can not be associated with those phenomena in the relation of cause and effect. Meteorological changes and conditions, due to astronomical causes, do not necessarily coincide in time of occur-

rence. The greatest heat of a summer's day does not occur when the sun is on the meridian, nor is the greatest heat of summer experienced in the middle latitudes of the Northern Hemisphere when the sun has reached the northern limit of its course.

If, therefore, the term "equinoctial storms" is to be preserved, and it undoubtedly will be, it may properly be employed to designate tropical storms, or hurricanes, cyclones, and typhoons, that occur in the Northern Hemisphere during the six or seven weeks that precede and follow the autumnal equinox. Many such storms may follow in rapid succession; each is *an* equinoctial storm. There is no one special storm to which the term "*the* equinoctial" should be applied.

SPECIAL CLOUD OBSERVATION.

An esteemed correspondent at Cunningham, Itasca County, Minn., Mr. David Rose, under date of December 8, 1906, states that at 11 a. m. of Friday, December 7, he "observed a clear rift of cloudless blue sky from the southern horizon thru the zenith to the northern horizon. On each side of this rift the clouds lookt like waves dashing against a rough beach." In reply to his query as to the cause and nature of this phenomenon the following letter has been sent. It would scarcely seem worth while to publish this reply were it not that so many persons are liable to make the mistake of assuming that some unknown mysterious electrical influence controls the formation of clouds, whereas the fact is cloud forms are produced by condensation of moisture under a myriad of complex conditions as to temperature, humidity, and wind, and it is these conditions that determine the nature of the cloud. If any electricity is developed in the formation of such a cloud it is a matter of very little consequence in comparison with the winds and the moisture, the barometric gradient, and the temperature gradient. Dynamic meteorology consists essentially in the study of the hydrodynamics and the thermodynamics of the atmosphere; the optical and electrical phenomena are matters of minor importance in relation to winds, storms, and weather, but they should be carefully studied by those who are expert in these matters.—EDITOR.

The weather map shows that on the morning of Friday, December 7, you were located on or near a narrow belt separating a region of cold westerly winds, which lay to the east of you, from a region of warmer southeast winds, which lay to the west of you. This latter region had disappeared by the morning of Saturday, December 8. I therefore infer that the clear, blue sky that you saw extending in a narrow band northward and southward was a region in which air was descending slowly, so that it might flow, some to the east and some to the west, toward these two regions of westerly and easterly winds, about as shown in this little sketch. In this case you would not be likely to feel any very

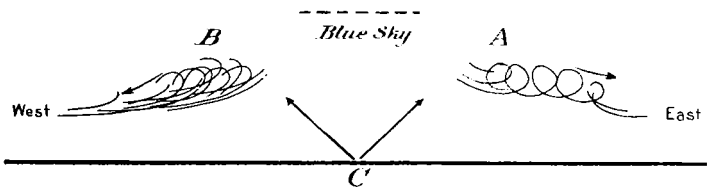

FIG. 1.—Vertical section thru clouds and clear rift.

strong winds, as the descending air would flow to the east or west before it reached the ground. However, the air rarely flows in straight lines, and these winds would undoubtedly roll over and over, forming belts of clouds at *A* and *B*, while the space between would be clear, blue sky, as seen from your point of view. The clouds that you saw are the so-called cumulus clouds, and belong to the lower atmosphere; they are not likely to have been more than a mile high at the top, but even if they were two miles, they would still be called lower clouds. This diagram, therefore, shows you that if the height of *A* and *B* above the ground was only two miles, and you were midway between them at *C*, then by walking a few miles east or west you would have gotten a very different view of the whole phenomenon, and persons who live five miles away would have seen nothing of it whatever. It is, therefore, not surprising that we have no records of the same phenomenon observed at other points of the country.

As the winds at *A* and *B* were fairly well balanced against each other, this clear intervening space remained nearly stationary; but eventually one must overcome the other, and, as you say that "it vanished gradually from the north", I infer that the blue sky was covered by clouds coming from that direction, where, as the map shows, we had high pressure and cold northerly winds. The whole country seems to have been covered by clouds next day.

LENTICULAR-CUMULUS CLOUDS IN COLORADO.

By J. B. WILLSEA. Dated Fruita, Mesa County, Colo., July 18, 1907.

The article on page 456 of the MONTHLY WEATHER REVIEW, for October, 1906, on lenticular-cumulus clouds has just come to my notice.

We have here an occasional cloud which may possibly be classed as lenticular-cumulus. It is of a rather dark color and in form resembles a saucer, or a number of saucers, placed one within the other, and then the pile turned upside down—the upper surface being convex, with a sharply defined outline—the lower surface not so pronouncedly convex and with a softer outline.

It usually accompanies or precedes a brisk wind and may appear singly or in numbers as high as five or six, altho two or three is ordinarily the limit.

Fig. 1 is a rough draft of them.

FIG. 1.—Lenticular-cumulus clouds.

They are always horizontal and sometimes move with considerable rapidity.

The pronounced cap shown in the third of Mr. Endicott's photographs (fig. 3, page 458, REVIEW for October, 1906), has not been observed by me.

I am convinced that those observed here are alto-cumulus clouds, seen edgewise, for the following reasons:

1. Because they have appeared in company with well-defined groups of alto-cumulus clouds, apparently at the same elevation, of the same shade, and apart from all other clouds.

2. Because these clouds are never seen near the zenith—always at a distance.

3. Because an alto-cumulus cloud, composed of one or more patches, reaching in a line toward the observer, must of necessity (when at a distance, so as to be seen edgewise), assume this form.

The clouds below the principal ones in Mr. Endicott's photographs show a suggestion of this formation, but the lower clouds are not in a direct line toward the observer, but bear away to the left. It was a puzzle to me for a long time why these clouds were not seen near the zenith.

Allow me to ask why the points at the sides of the clouds always curve slightly downward, never upward.

As to another matter, that of precipitation following a solar halo, I will say that in nearly five years my records show 16 halos, and that considering the following days 6 halos were followed by precipitation while 10 halos were not; but this is a very dry climate where we get only 8 or 10 inches of precipitation per annum.

DISTINGUISHED COOPERATIVE OBSERVERS.

The Weather Bureau has maintained many stations for thirty-seven years past, but, as is well known, its observers are employed specifically for such work, have a great variety of duties, and are often moved from one station to another, while the exact locations of the offices and instruments are also frequently changed, so that the comparability of methods and exposures is impaired.

Very different conditions pertain with our faithful voluntary cooperative observers. In these cases there are but few changes in the instruments or the locations or the men at any